

NOTES ON THE MARINE VELIID GENERA

HALOVELOIDES, HALOVELIA AND XENOBATES

(HEMIPTERA-HETEROPTERA, VELIIDAE) OF PAPUA

NEW GUINEA

Lansbury, I., 1996. Notes on the marine veliid genera *Haloveloides*, *Halovelina* and *Xenobates* (Hemiptera-Heteroptera, Veliidae) of Papua New Guinea. – *Tijdschrift voor Entomologie* 139: 17–28, figs. 1–53, tables 1–8. [ISSN 0040-7496]. Published 15 October 1996.

The marine veliid genera *Haloveloides* Andersen, *Halovelina* Bergroth and *Xenobates* Esaki from Madang Province, Nagada Harbour were studied in February–March, 1990 and April–May, 1992. Supplementary comments on the occurrence of marine veliids in New Britain are included. *Halovelina anderseni* sp. n. and *Xenobates pilosellus* sp. n. are described from Nagada Harbour. *Xenobates solomonensis* Lansbury is redescribed, the male for the first time. The distribution of the veliids at Nagada are set out in tabular form. Brief comments are given on the occurrence of species particularly the species diversity found in diurnal and nocturnal samples.

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Key words. – Papua New Guinea: Madang and New Britain. Hemiptera Veliidae: *Halovelina*, *Haloveloides*, *Xenobates*, new species, distribution.

The marine Heteroptera fauna of Nagada Harbour has a remarkable number of species present including Gerridae, *Rheumatometroides serena* Lansbury; three possibly four species of *Halobates*; Hematobatidae, *Hematobates* species; Veliidae, Haloveliinae, *Haloveloides papuensis* (Esaki), *H. browni* (Lansbury), *Halovelina annemariae* Andersen, *H. anderseni* sp. n., *Xenobates solomonensis* Lansbury and *X. pilosellus* sp. n. The four described veliid species have been recorded from the Solomon Islands. Two other veliid species also recorded from the Solomon Islands and the ‘north’ coast of New Guinea, *Halovelina bergrothi* Esaki and *H. esakii* Andersen, these species were not found at Nagada Harbour.

Esaki (1926) gave the first account of the marine veliids collected by Biro from the north coast of Papua New Guinea. He quotes Dr. Biro on the occurrence of *Xenobates* Esaki on brackish water and *H. bergrothi* being found on rain water in a tree hole.

Halovelina Bergroth revised by Andersen (1989a and b) and *Haloveloides* Andersen (1992), *Xenobates* Esaki appears to be a less well defined genus. Andersen (1992) comments on the generic classification and gives a key to the genera of the Haloveliinae.

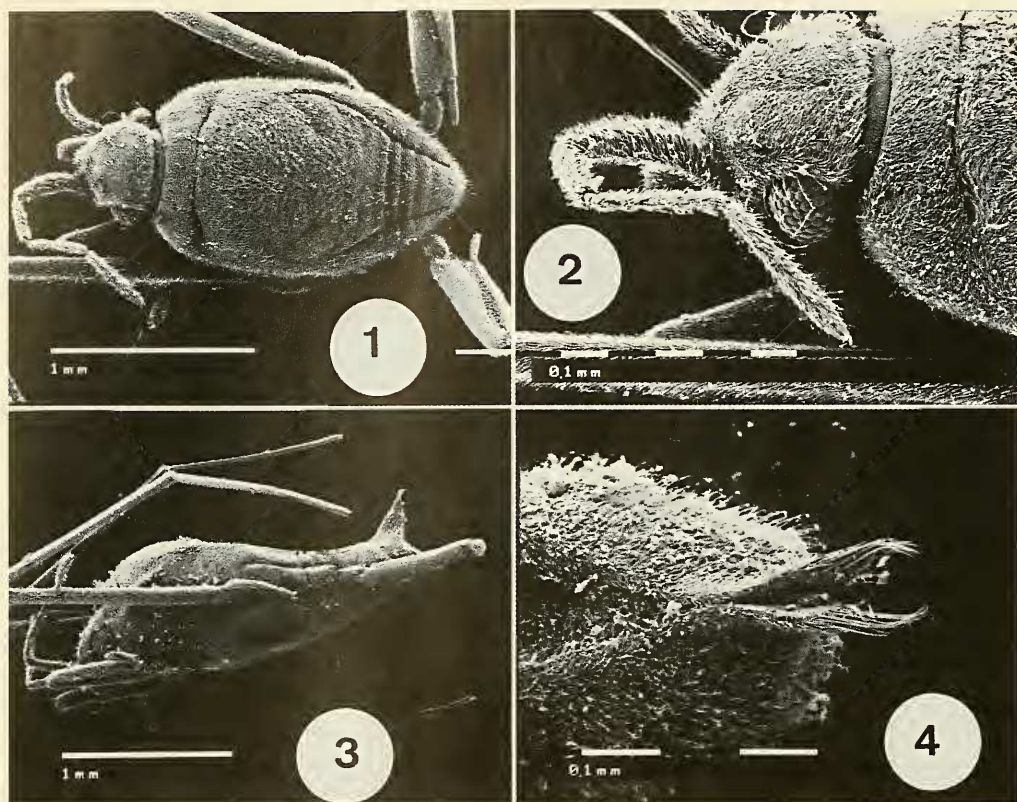
MATERIALS AND METHODS

Habitats at Nagada. – The sampling area is not

large but does include a variety of micro-habitats close inshore, mangrove was absent from the area. The tidal levels do not vary by more than a metre, frequently far less. At low tide there are no extensive beaches with rocks and shallow pools. There is some erosion of the shore line, leading to trees falling into the sea which provides sheltered micro-habitats for marine bugs. Data on the species collected are presented in tabular form with a brief description of the habitats.

1990 Samples. – ‘Jetty shade’ walkway from shore to landing stage on piers constructed using tyres filled with concrete, walkway rough sawn timber. ‘Coral rubble’ shore line coral rubble wall, lower margin usually partially submerged, occasionally totally exposed. In places overhung with trees, some leaning over, others have fallen into the sea due to erosion ‘coral rubble with trees’. ‘Mvlt’ (mercury vapour light trap) samples collected from a partially enclosed area on the landing stage supported on piers at the end of the jetty.

1992 Samples. – ‘Mvlt’ samples from a secondary landing stage overhung with trees, slightly more exposed than the 1990 site, subject to wave action. Samples collected with a hand net 300 µm mesh. Daylight samples; despite intensive searching, no veliids were seen between dawn to sometime after 12.00. Occasionally large flotillas were seen close inshore, al-



Figs. 1-4, *Halovelis anderseni* sp. n. – 1, ♂ dorsal aspect; 2, ♂ dorsal aspect; 3, ♀ lateral aspect of abdomen; 4, ♀ dorsal aspect of abdomen.

ways in the shade from 15.00 onwards, these flotillas were almost exclusively *H. papuensis*. The mvt samples collected with hand net and were removed from the net by inverting the contents into a large container of dilute alcohol ca 30%. This technique frequently has the affect of causing the male genitalia and female ovipositor to be extruded. A minor problem is that salt particles adhere to the specimens which are not completely removed by washing in distilled water prior to storage in 70% alcohol. Light trap captures were totally random as it was impossible to see veliids whereas *Halobates* were extremely conspicuous.

The specimens from Madang Province and East and West New Britain and holotypes deposited in the Hope Entomological Collections, University Museum, Oxford (OXUM). Paratypes and other material in the National Museum of Natural History, Leiden (RMNH) and the Zoological Museum, University of Copenhagen (ZMUC).

SYSTEMATICS

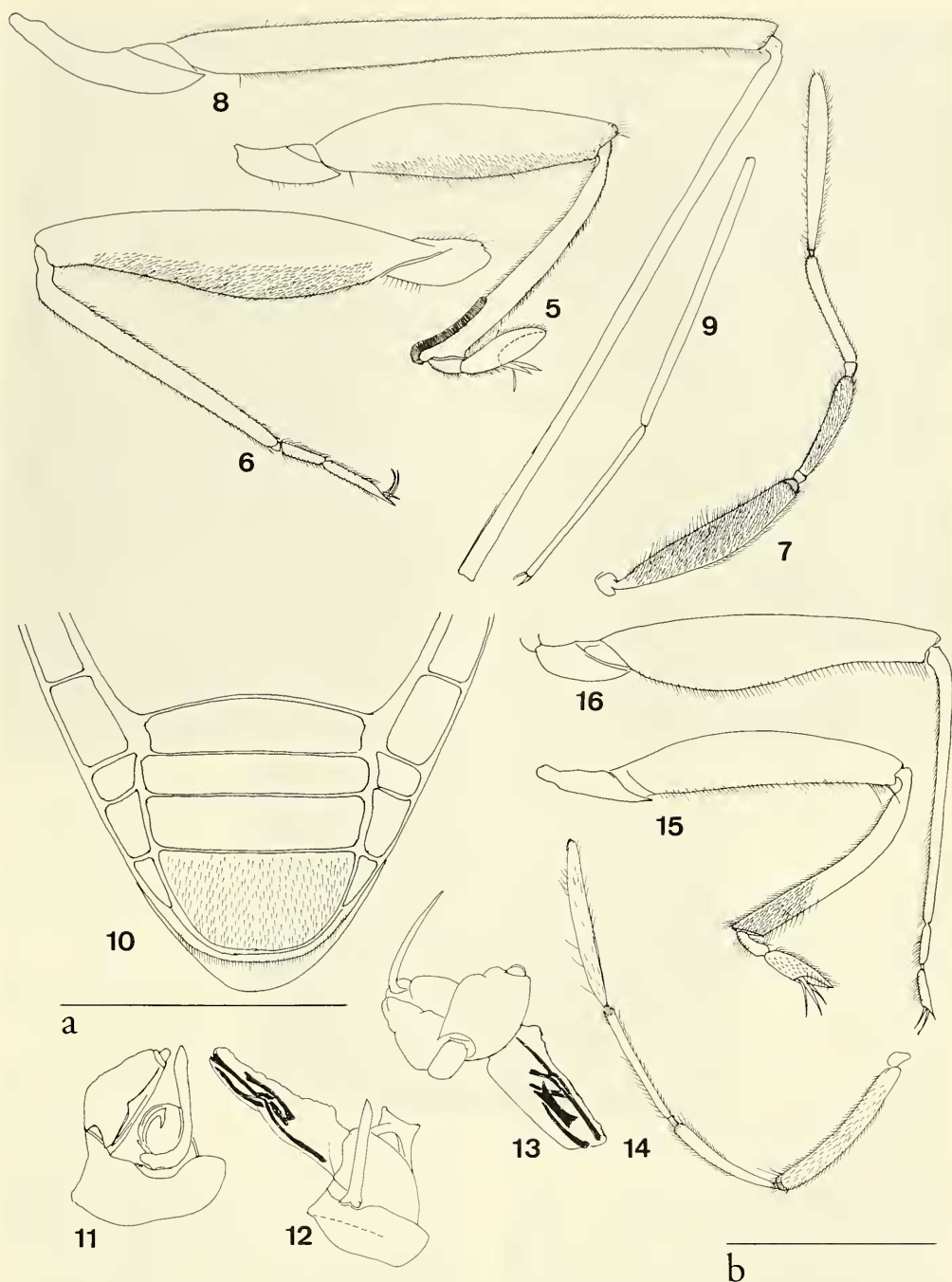
Halovelis anderseni sp. n.
(figs. 1-17, tabs. 1 and 4)

Type material. – Holotype male: Papua New Guinea, Madang Province, Madang, Nagada Harbour, 25.ii.1990, collected at light (in OXUM). – Paratypes same locality as holotype, 24.ii.-16.iii., 62 ♀ ♂ and 74 ♀. Paratypes same locality of holotype, 29.iv.-21.v., 302 ♂ and 160 ♀ (OXUM and RMNH). See table 4 for details of collecting sites.

Description

Adult apterous. – Males 1.94-1.97 mm long, maximum width 0.96-1 mm, females 2.2-2.4 mm long, maximum width 0.96-0.98 mm.

Coloration. – Male: Dark brown-black. Inner lateral margins of connexivum silvery pubescent. Head between eyes dark yellowish brown. Posterior margin of pronotum narrowly dark brown. Legs shining black, antennae black. Inner margins of front



Figs. 5-16. — 5-9, *Halovelia anderseni* sp. n. paratypes. — 5, ♂ front leg; 6, ♂ hind leg; 7, ♂ antennae; 8, ♀ middle femur and tibia; 9, ♀ middle tarsi. — 10-13, *Halovelia anderseni* sp. n. paratype male. — 10, tergite partially macerated; 11, genital capsule; 12, genital capsule extended; 13, genital capsule rotated. — 14-16, *Halovelia anderseni* sp. n. paratype female. — 14, antennae; 15, front leg; 16, hind leg. Scale bars (a for fig. 10 and b for all other figs.) .5 mm.

Table 1. Proportion of leg segments of *Halovelvia anderseni* sp. n.

		Femur	Tibia	Tarsus I	Tarsus II
♂	front leg	36	31	4	9
♀	front leg	34	27	4	9
♂	middle leg	89	79	38	22
♀	middle leg	75	69	31	22
♂	hind leg	43	34	5	9
♀	hind leg	36	32	5	9

coxal margins brown, remainder of venter black.

Coloration. – Female: Similar to male.

Structure. – Male: Elongate fusiform (fig. 1). Head length $0.53 \times$ head width including eyes, widest interocular space $0.62 \times$ head width, eye width $0.3 \times$ interocular space. Antennae (figs. 2 and 7) segment 1-4 25:13:14:18, antennae $0.7 \times$ total length of insect. First antennal segment densely pilose, broader than fusiform 4th segment. Lateral margins of pronotum obsolescent. Meso and metanotum not clearly distinct. Tergites subequal length, 5th tergite and genital segment progressively longer. Connexivum slightly raised. Distal tergites partially macerated and slide mounted (fig. 10), connexival segments irregular. Metasternum posteriorly fringed with fine greyish pubescence. Sternites deeply depressed, genital segment large, genital capsule within abdomen, parameres conspicuous curving round capsule, meeting posteriorly. Genital capsule lateral aspect (fig. 11), parameres symmetrical, bluntly acuminate distally. Capsule rotated (fig. 12) showing vesica side view; (fig. 13) capsule rotated showing vesical sclerites from another aspect, parameres appearing distally acuminate.

Front leg (fig. 5) trochanter not spinose or tuberculate. Femora slightly sinuate, greatest width $0.2 \times$ length. Inner margin of tibia fringed with fine hairs, distally with a grasping comb extending round distal margin, tibial comb $0.35 \times$ length of tibia. Middle femora $0.9 \times$ total length of insect. Hind femora robust, greatest width $1.6 \times$ width of middle femora (fig. 6).

Structure. – Female: Rhomboid in outline. Head length $0.62 \times$ head width across eyes. Widest interocular space $0.62 \times$ head width including eyes. Eye width $0.27 \times$ interocular space. Antennae (fig. 14) segment 1-4 20:11.5:15:20, antennae $0.57 \times$ total body length, 4th segment not as fusiform as in male.

Thorax box-like, lateral margins straight, diverging slightly from the pronotum. Head pronotum and dorsum of thorax with a dense layer of fine grey pubescence. Anterior pronotal margin with a prominent dense transverse cluster of erect hairs. Pleura, pro and mesosternum dull, not conspicuously pilose. Anterior connexival segment erect with a row of erect hairs.

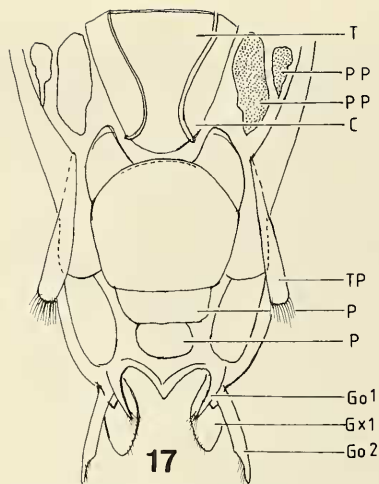


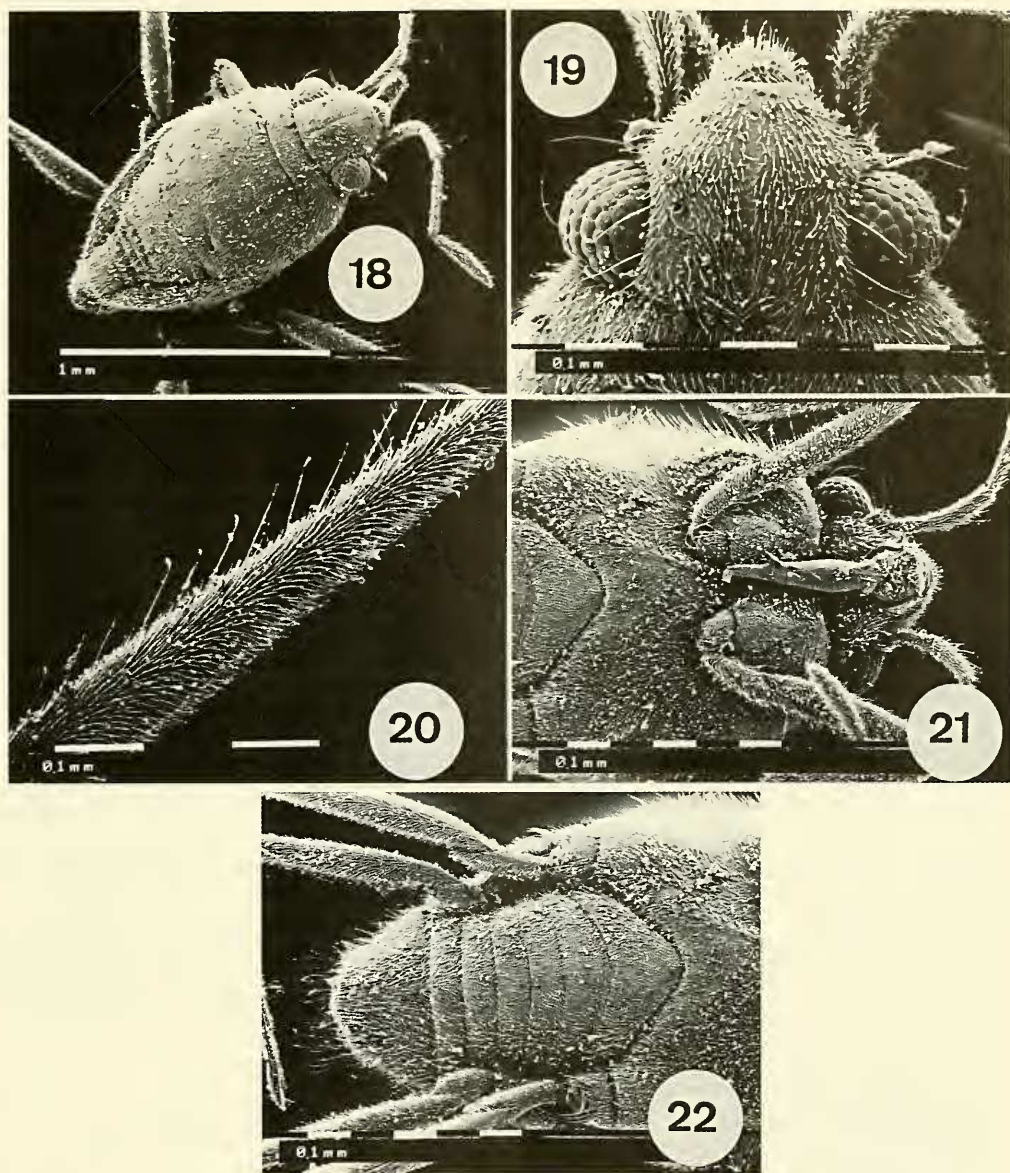
Fig. 17. *Halovelvia anderseni* sp. n. paratype female. – Distal tergites partially macerated. Abbreviations T tergite; PP pleural plates; C connexivum; TP triangular plates; P proctiger; GO1 GO2 1st and 2nd gonopophyses; GX 1st gonocoxa.

First four visible tergites narrowing, enclosed by connexivum. Distally connexivum converging appearing to terminate with a prominent pilose triangular projection (figs. 3 and 4) Genital segment enlarged. Abdomen wider distally than proximally. Distal tergites and connexivum partially macerated, slide mounted (fig. 17) show that the triangular projections arise from the pleural margins of sternites. Pleural margins divided into several elongate plates. Eighth tergite bluntly triangular, lateral margins inflexed. Ovipositor and proctiger extended, first gonocoxa plate-like, 1st gonopophyses elongate, 2nd gonopophyses short and spinose.

Front leg (fig. 15) lower femoral margin straight, greatest width $0.17 \times$ length, tibia sinuate. Middle leg (fig. 8) femora $0.76 \times$ total length of insect. Hind leg (fig. 16) robust greatest width $0.22 \times$ length.

Etymology. – This species is dedicated to Dr. Nils Møller Andersen who has been of great assistance in naming the Veliidae found in the Nagada samples.

Remarks. – The male of *H. anderseni* sp. n. appears to key out to couplet 14 in Andersen (1989a) (*H. lannae* and *H. wallacei* Andersen), the parameres resemble *wallacei*. The female does not key out to the foregoing species as the antennal ratio of segment 2 is much shorter than the 3rd segment and therefore keys out to couplet 10 (*H. annemariae* and *novoguiniensis* Andersen). The female of *H. anderseni* sp. n. is immediately recognisable by the distal triangular projections on the abdomen.



Figs. 18-22. *Xenobates pilosellus* sp. n. – 18, ♂ dorsal aspect; 19, ♂ dorsal view of head, 20, ♂ middle femur; 21, ♀ under-side of head and pronotum; 22, ♀ abdomen ventrally.

Xenobates pilosellus sp. n.
(figs. 18-36, tabs. 2, 5 and 8)

Type material. – Holotype male: Papua New Guinea, Madang Province, Madang, Nagada Harbour, 14.ii.1990, collected at light (in OXUM). – Paratypes same locality as holotype, 22.ii.-16.iii., 134♂ and 477♀. Paratypes same locality as holotype 29.iv.-21.v., 21♂ and 49♀ (OXUM, RMNH

and ZMUC). See table 5 for details of collecting sites.

Description

Adult apterous. – Males 1.3-1.44 mm long, maximum width 0.72-0.74 mm, females 1.6-1.72 mm long, maximum width 0.92-0.94 mm.

Coloration. – Male: Head antero-mesially with a longitudinal stripe and inner eye margins black, re-

Table 2. Proportion of leg segments of *Xenobates pilosellus* sp. n.

		Femur	Tibia	Tarsus I	Tarsus II
♂	front leg	23	20	2	7
♀	front leg	23	21	2	6.5
♂	middle leg	61	48	18	14.5
♀	middle leg	63	51	23	15.5
♂	hind leg	30	25	2	7
♀	hind leg	32	25	3	6

mainder orange brown. Anterior margin of pronotum black, remainder orange brown, remainder of dorsum black. Coxae and trochanters pale creamy yellow. Upper proximal margin of front femora pale brown, remainder of legs dark brown-black. Antennae, 1st segment proximally narrowly pale yellow, remaining segments dark brown-black. Pro-meso and metasternum pale orange brown. Pleural margins of thorax and sternites dark brown-black, mesially orange brown.

Coloration. – Female: Head and pronotum similar to male. Distal lateral margins of meso-metathorax with two (1+1) dark yellow blotches, remainder of dorsum black. Legs and antennae similar to male. Underside of head, thorax and abdomen pale orange brown. Pleura of thorax and sternites marginally dark brown-black, not as extensive as on male.

Structure. – Male: Fusiform (fig. 18). Head length $0.62 \times$ head width including eyes. Interocular space $0.54 \times$ head width. Eye width $0.39 \times$ interocular space. Head mesially with a slight median depression lacking pilosity (fig. 19). Cephalic trichobothria prominent. Lateral margins of head with 3-4 long hairs curving over the eyes. Antennae (fig. 23) segment 1-4 14 : 10.5 : 15 : 12, antennae $0.7 \times$ total length of insect, 4th segment fusiform. pronotal lateral margins obsolescent. Mesonotal suture visible laterally, metanotal suture visible laterally contiguous with connexivum. Mesothorax with two (1+1) fields of silver hairs extending onto connexivum. Tergites 3-5 with scattered silver hairs mesially, 6th tergite covered with evanescent silvery blue hairs extending onto connexivum. Anteriorly connexivum erect, distally outwardly reflexed. Distal tergites partially macerated, slide mounted (fig. 29), connexival segments regular. Thorax ventrally; dark pleural margins with semi-erect pubescence. Pale area of pro-meso and metasternum with short fine pubescence. Distal margin of mesosternum fringed with fine hairs. Sternites 1-5 raised above transversely depressed 6th sternite. Distal median area of raised sternites conspicuously pilose. Genital segment large, capsule within segment, parameres symmetrical, curving round capsule (fig. 30).

Front leg (fig. 31) femora moderately robust, greatest width $0.2 \times$ median length. Tibia distally pilose.

Middle leg (figs. 20, 32 and 33) femora fringed with long hairs, $0.84 \times$ total length of insect. Hind leg (fig. 34) femora slightly more robust than middle femora.

Structure. – Female: Rhomboid in outline. Head length $0.62 \times$ head width including eyes. Interocular space $0.51 \times$ head width. Eye width $0.45 \times$ interocular space. Antennae (fig. 24) segment 1-4 13.5 : 10 : 14.5 : 12.5, antennae $0.6 \times$ total length of insect. Lateral margins of prothorax densely pilose, straight diverging from pronotum to connexivum. Abdomen converging distally. Mesonotum with two (1+1) fields of short silvery hairs overlying the orange brown areas, between these a median black area with two (1+1) fields of silvery peg-like hairs. Metanotum anteriorly with longer silvery hairs overlying black pubescence. Mesonotum slightly raised above metanotum, the latter slightly raised mesially. Second and 3rd tergites laterally with two (1+1) fields of silvery hairs. Sixth and 7th tergites with scattered short silvery hairs. Tergites partially macerated, slide mounted (fig. 28), ovipositor partially extruded. Connexivum erect converging sharply posteriorly exposing pleura of distal sternites. Distal tergite densely pilose. Underside of head and thorax (fig. 21), pleural margins densely pilose. Sternum posterior of front legs triangularly raised 'Y' shaped. Mesosternum and sternites (fig. 22), genital segment densely pilose.

Front leg (fig. 35) femora with several prominent hairs ventrally, not as robust as male, tibia slightly sinuate. Middle leg (figs. 25, 26 and 27) femora slender, $0.75 \times$ length of insect. Hind leg (fig. 36) greatest femoral width subequal to middle femora.

Etymology. – The specific name alludes to the dense pubescence on the thoracic pleura and abdomen distally.

Remarks. – The three dark brown-black 'stripes' on the head on a orange brown field, densely pilose pleura and abdomen distinguish *Xenobates pilosellus* sp. n. from *X. solomonensis* Lansbury.

Xenobates solomonensis Lansbury (figs. 37-53, tabs. 3 and 5)

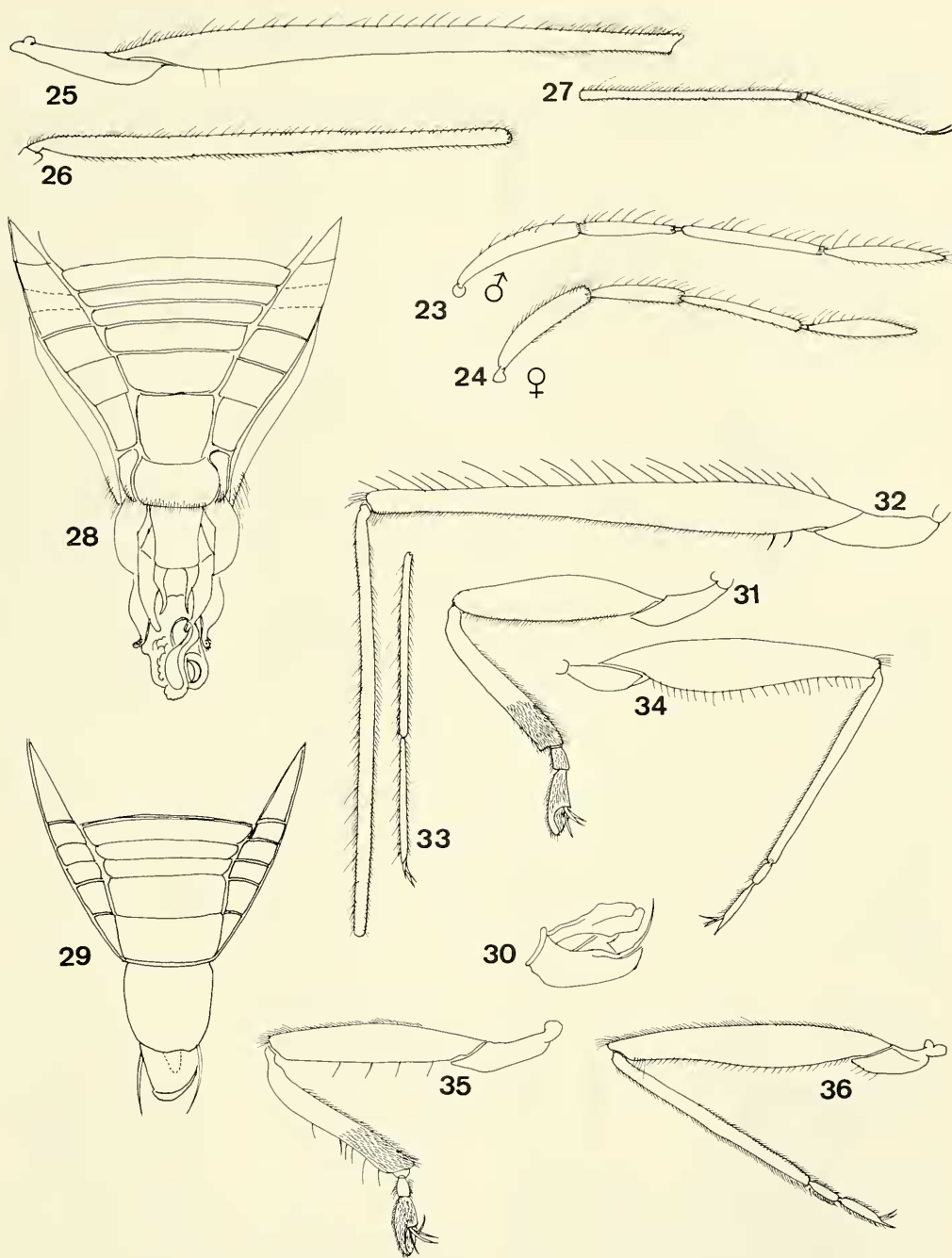
Xenobates solomonensis Lansbury, 1989: 107-109.

Redescription

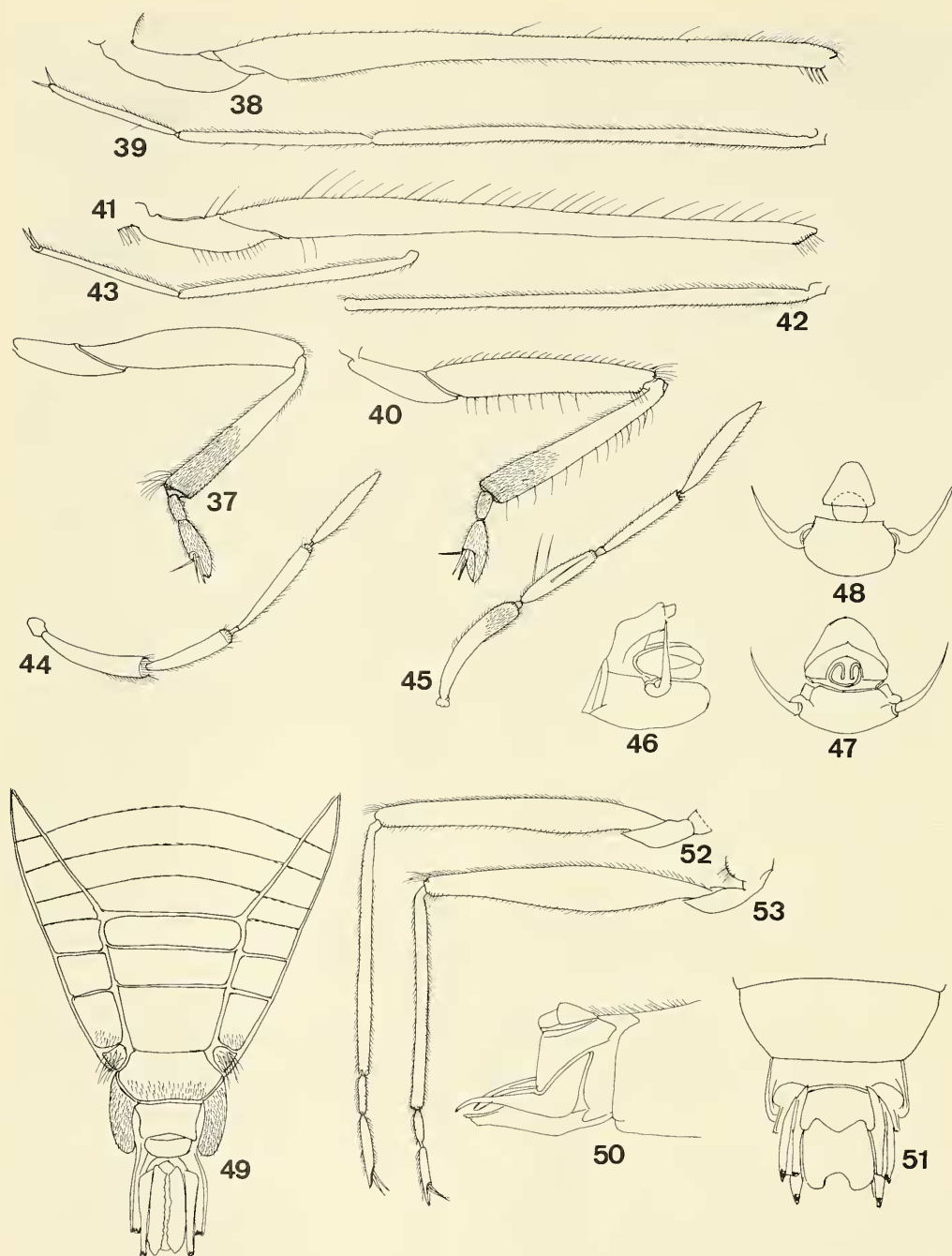
Adult apterous. – Males: 1.56-1.6 mm long, maxi-

Table 3. Proportion of leg segments of *Xenobates solomonensis* Lansbury.

		Femur	Tibia	Tarsus I	Tarsus II
♂	front leg	23	20	3	7.5
♀	front leg	26	22	3	8
♂	middle leg	64	52	21	16.5
♀	middle leg	68	54	25	17
♂	hind leg	32	25	3.5	7.5
♀	hind leg	32	27	3	8



Figs. 23-36. — 23-27, *Xenobates pilosellus* sp. n. paratypes. — 23, ♂ antennae; 24, ♀ antennae; 25, ♀ middle femur; 26, middle tibia; 27, ♀ middle tarsi. — 28-30, *Xenobates pilosellus* sp. n. paratypes. — 28, ♀ abdomen partially macerated; 29, ♂ abdomen partially macerated; 30, ♂ genital capsule. — 31-36, *Xenobates pilosellus* sp. n. paratypes. — 31, ♂ front leg; 32, ♂ middle femur and tibia; 33, ♂ middle tarsi; 34, ♂ hind leg; 35, ♂ front leg; 36, ♀ hind leg. Scale bar .5 mm.



Figs. 37-53. – 37-45, *Xenobates solomonensis* Lansbury. – 37, ♂ front leg; 38, ♂ middle femur; 39, ♂ middle tibia and tarsi; 40, ♀ front leg; 41, ♀ middle femur; 42, ♀ middle tibia; 43, ♀ middle tarsi; 44, ♂ antennae; 45, ♀ antennae. – 46-53, *Xenobates solomonensis* Lansbury. – 46, ♂ genital capsule; 47, ♂ genital capsule ventral aspect; 48, ♂ genital capsule end on aspect; 49, ♀ abdomen partially macerated; 50, ♀ lateral aspect of ovipositor; 51, ♀ ovipositor ventral aspect; 52, ♀ hind leg; 53, ♂ hind leg. Scale bar .5 mm.

Table 4. Occurrence of *Haloveloides* and *Halovelina* species at Nagada.

Habitat	Time	<i>papuensis</i>		<i>browni</i>		<i>anderseni</i>		<i>annemariae</i>	
		♂	♀	♂	♀	♂	♀	♂	♀
1990									
17.ii.	jetty shade	18.00	14	2					
18.ii.	jetty shade	17.00	150	38					
22.ii.	jetty shade	17.00	9	2					
23.ii.	jetty shade	17.30	25	20					
24.ii.	mvlt	20.00-21.00		8	18	5	1	4	
25.ii.	mvlt	20.30-22.00	23	33	25	27	8	11	13
26.ii.	mvlt	20.15-21.5	24	6	31	13	9	26	46
27.ii.	jetty shade	16.00	36	40					53
27.ii.	mvlt	20.30-21.30	21	22	17	15	8	7	29
1.iii.	jetty shade	15.00	312	218	5				31
3.iii.	mvlt	21.00-22.00	5	5	7	3			6
4.iii.	rubble with trees	15.00	368	300	3				8
4.iii.	rubble with trees	18.00	11	6					
5.iii.	fallen tree	16.00-17.15	116	23					
5.iii.	mvlt	20.30-21.30		4	2			7	5
6.iii.	submerged tree-jetty	16.00-17.00	16	4					
7.iii.	jetty shade	17.00	5	15	1		23	2	1
8.iii.	rubble with trees	16.00	42	12					
9.iii.	coral rubble	16.00	22	9					
9.iii.	mvlt	20.00-21.15	22	13	7	1	3	1	
10.iii.	coral rubble	16.00	31	2					
10.iii.	mvlt	20.15-21.15	10	4	1	5	1	5	3
12.iii.	mvlt	20.45-21.50	52	26	2	2		4	7
13.iii.	mvlt	21.00-22.00	28	50	6	5		3	9
24.iii.	mvlt	20.30-21.30	3	22	7	2	9	7	3
16.iii.	submerged tree	15.00	308	338	6	5			4
16.iii.	mvlt	20.45-21.45	12	15	7	3	1	4	27
									13
1992									
29.iv.	mvlt	20.00-00	5	4			52	39	4
30.iv.	mvlt	20.15-21.15	2	3			11	8	12
1.v.	mvlt	20.15-21.15	5	6				1	3
2.v.	mvlt	20.15-21.15	1	1					
4.v.	mvlt	20.15-21.30	8	12				2	
5.v.	mvlt	17.30-19.00	22	13					
7.v.	jetty shade	13.30	48	17					
7.v.	mvlt	20.30-21.30						1	
8.v.	mvlt	20.30-21.30		2					
11.v.	mvlt	20.00-21.30	15	18			1	1	4
12.v.	mvlt	20.00-21.00	8	27			1	1	1
13.v.	mvlt	20.00-20.30	3	4					
15.v.	mvlt	20.15-22.00	12	7			4	7	7
16.v.	mvlt	20.00-23.00	20	30			3	1	1
18.v.	mvlt	20.15-21.30	18	6					2
19.v.	mvlt	20.00-22.00	38	39			16	16	8
20.v.	mvlt	20.30-21.45	91	58			212	79	43
21.v.	mvlt	20.30-21.30	10	35			1	5	18
									11

mm width 0.82-0.84 mm, females 1.8-1.82 mm long, maximum width 0.98-1.02 mm.

Coloration. – Male: head and pronotum yellowish brown, anterior lateral margins of head with two (1+1) with irregular black blotches, lateral margins of pronotum black. Mesonotum black with a conspicuous field of silvery-yellow hairs, laterally with transverse bands of silver hairs. Tergites and connexivum black. Tergites 1-2 with fields of silver hairs, 6th ter-

gite with longer scattered silver hairs. Thoracic pleura dark brown-black merging into pale brown ventrally. Pro-meso and metasternum pale yellowish brown. Sternites laterally dark brown-black graduating to pale brown. Antennae, 1st segment proximally pale yellow, remainder of segments black. Front coxae, trochanters and femora pale yellow, annulated dark brown distally, tibia and tarsi black. Middle and hind coxae and trochanters pale yellow, lower margins of

Table 5. Occurrence of *Xenobates* species at Nagada.

	Habitat	Time	<i>solomonensis</i>		<i>pilosellus</i>	
			♂	♀	♂	♀
1990						
22.ii.	jetty shade	17.00				2
23.ii.	jetty shade	17.30	1	1	1	1
25.ii.	mvlt	20.30-22.00	1	1	3	9
26.ii.	mvlt	20.15-21.50	6	3	13	51
27.ii.	mvlt	20.30-21.30	2	3	3	61
1.iii.	jetty shade	15.00	3	1	9	32
1.iii.	mvlt	20.30-21.00				1
3.iii.	mvlt	21.00-22.00	1	3	5	29
4.iii.	rubble with trees	15.00	1			
4.iii.	rubble with trees	18.00	1		1	2
5.iii.	fallen tree	16.00-17.15			11	8
5.iii.	mvlt	20.30-21.30		1	2	5
6.iii.	submerged tree-jetty	16.00-17.00	1	1	1	3
7.iii.	jetty shade	17.00			3	1
8.iii.	rubble with trees	16.00	8	3	13	21
9.iii.	coral rubble	16.00	12	9	13	1
9.iii.	mvlt	20.00-21.15	3	4	6	32
10.iii.	coral rubble	16.00	8	4	2	4
10.iii.	mvlt	20.15-21.15	3	8	17	28
12.iii.	mvlt	20.45-21.50	1		21	84
13.iii.	mvlt	21.00-22.00	2	2	8	56
14.iii.	mvlt	20.30-21.30			2	11
16.iii.	submerged tree	15.00	1	2		3
16.iii.	mvlt	20.45-21.45	1	2	2	33
1992						
29.iv.	mvlt	20.00-22.00				2
30.iv.	mvlt	20.15-21.15		3	1	4
1.v.	mvlt	20.15-21.15		2	1	
2.v.	mvlt	20.15-21.15		3		2
4.v.	mvlt	20.15-21.30			1	4
5.v.	mvlt	17.30-19.00		6	2	5
7.v.	jetty shade	13.30		2	1	
7.v.	mvlt	20.30-21.30	1		2	1
11.v.	mvlt	20.00-21.30	2	6		2
12.v.	mvlt	20.00-21.00	3	3	1	4
13.v.	mvlt	20.00-20.30		3	1	
15.v.	mvlt	20.15-22.00		1		1
16.v.	mvlt	20.00-23.00	18	12	1	3
19.v.	mvlt	20.00-22.00		6	5	10
20.v.	mvlt	20.00-21.45	6	15	5	4
21.v.	mvlt	20.30-21.30	1	2	1	6

femora pale brown, upper surfaces dark brown, tibia and tarsi dark brown-black.

Coloration. – Female: Head and pronotum bright yellowish brown, black pattern similar to male. Mesonotum mesially dark brown covered with semi-erect silvery hairs. Metanotum dark brown-black with short silver hairs. Tergites 1-2 black, laterally with silver hairs, 3-6 brown, distal margins black, tergites 5-6 with scattered silver hairs. Connexivum dark brown, upper margins narrowly black. Thoracic pleura and lateral margins of sternites reddish brown. Promeso and metasternum and sternites yellowish brown, 6th sternite shining. Antennae similar to male. Coxae and trochanters pale yellow. Front femo-

ra pale yellowish brown, paler on underside, tibia and tarsi black. Middle and hind femora either paler on lower surface or uniformly brown, middle and hind tibia and tarsi dark brown-black.

Structure. – Male: Fusiform. head length $0.58 \times$ head width, interocular space $0.57 \times$ head width including eyes, eye width $0.4 \times$ interocular space. Head with a prominent minutely sculptured median longitudinal depression. Head posteriorly with two (1+1) clusters of circular protuberances. Antennae (fig. 44) segment 1-4 13 : 10 : 13 : 12.5, antennae $0.6 \times$ total length of insect, 4th segment fusiform. Pronotal lateral margins obsolescent. Meso and metanotal sutures only visible laterally in partially macerated specimens,

Table 6. Occurrence of *H. papuensis* and *Halobates* immatures (imm.) at Nagada.

1990	Habitat	Time	<i>H. papuensis</i>	<i>Halobates</i>
18.ii.	jetty shade	17.00	many imm.	many imm.
23.ii.	jetty shade	17.30	30	50+
27.ii.	jetty shade	16.00	1000+	70+
1.iii.	jetty shade	15.00	1700+	170+
4.iii.	rubble with trees	15.00	850+	
5.iii.	fallen tree	16.00	300+	not counted
6.iii.	submerged tree jetty	16.00	70+	130+
8.iii.*	rubble with trees	16.00	500+	

* includes immature *Xenobates*

sutures obscured by dorsal pilosity on dry mounted specimens. Thoracic pleura, outer margins of connexivum and sternites pilose, genital segment shining and pilose. Thorax ventrally; mesosternum slightly raised 'Y' shaped, distal margin fringed with short hairs. Mesosternum and sternites 1-4 raised forming a rounded ridge, distal sternites deeply depressed. Genital capsule within segment, parameres partially visible curving round segment. Genital segment partially macerated, lateral aspect (fig. 46), ventral and end on aspect (figs. 47 and 48). Prothorax and proximal tergites forming an even convex curve, distal tergites slightly depressed. Connexivum slightly outwardly reflexed, inner margins silvery pubescent.

Front leg (fig. 37), femoral width $0.22 \times$ median length. Middle leg (figs. 38 and 39) femora fringed with hairs, not as pilose as female middle femora, $0.8 \times$ total length of insect. Hind leg (fig. 53) femora $0.5 \times$ length of middle femora, greatest width subequal to middle femora.

Structure. — Female: Rhomboid in outline. Head length $0.5 \times$ head width across eyes, interocular space $0.55 \times$ head width, eye width $0.39 \times$ interocular space. Median longitudinal depression more conspicuous than of male. Antennae (fig. 45) segment 1-4 14.5 : 11 : 13 : 13, antennae $0.57 \times$ total length of insect, 2nd segment spinose, 4th fusiform.

Lateral margins of prothorax pilose, straight and diverging from pronotum to connexivum. Prothorax raised above tergites, connexivum slightly outwardly reflexed, outer margins pilose. Abdominal tergites partially macerated, slide mounted (fig. 49).

Ovipositor partially extruded, lateral aspect (fig. 50), ventral aspect (fig. 51). Mesosternum slightly raised 'Y' shaped, distal margin infuscated, less pilose than male. Metasternum and sternites uniformly rounded, not raised. Sternites mesially pilose distally, genital segment densely pilose.

Front leg (fig. 40) femora ventrally with long hairs, femoral width $0.19 \times$ median length. Middle leg (figs. 41, 42 and 43), femoral upper margin with many long hairs, femora $0.75 \times$ total length of insect. Hind leg (fig. 52) femora $0.47 \times$ length of middle femora, greatest width subequal to middle femora.

Remarks. — *Xenobates solomonensis* Lansbury described from the Solomon Islands, New Georgia, Munda, Holotype in OXUM. It differs from other described *Xenobates* by the bright orange yellow head in both sexes, the head of *X. pilosellus* sp. n. and *X. seminulum* (Esaki) differ by the much darker head.

Material. — See table 5 for samples from Papua New Guinea, Madang Province, Madang, Nagada Harbour, 1990 and 1992.

MISCELLANEOUS BIOLOGICAL NOTES

Haloveloides papuensis (Esaki): this species invariably encountered close inshore, usually within 2 metres. Large flotillas of specimens occurring in the shade of the jetty walkway or sheltering in the lee of partially submerged trees or amongst overhanging vegetation. Large samples e.g. over 500 specimens were taken with a single sweep of the net. *H. papuensis* flotillas move slowly, keeping very close together. Wave action created by boats passing at speed causing the flotillas to disperse rapidly, sometimes the rafts re-assembling within a few minutes, on other occasions, flotillas amongst overhanging vegetation sometimes remaining dispersed. A feature of the *papuensis* flotillas is the presence of many teneral adults as well as large numbers of immature veliids and 1st and 2nd instar *Halobates* species.

Especially noticeable are the much lower numbers of *papuensis* attracted to light and no immatures were found in the samples although immature *Halobates* (3rd and 4th instar) were frequently more abundant than adult *Halobates*. The 1992 samples differ considerably from the 1990 samples, despite intensive sampling and searching, only one flotilla of veliids were found inshore on the 7.v. The number of

Table 7. Occurrence of *H. browni* in West New Britain.

1989	Location	♂	♀
1.vii	Dami Creek 'freshwater'	6	
29.vii	Kimbe, Dami near Talasea 200 m. offshore around pontoon oil drums	79	1
30.vii	Vovosi 500 m. offshore around exposed reef at low tide	108	3
2.viii	Dami near Talasea 200 m. offshore	42	

Table 8. Occurrence of *Xenobates* species in New Britain.

Location		<i>pilosellus</i> ♂	♀	<i>solomonensis</i> ♂	♀
1988					
2.x	Dami Creek river mouth	6	6		
1989					
8-10.i	Dami Creek 'saline'	2	2		
9.iv	Kapiura River tidal creek	8	2		1
10.vi	Tamari Beach				2
20.vii	Dami Creek	8	7		
19.viii	Balima River near Ulamona		1		
1993					
28.iii	Bainings, Kleinwara River Ramada Pltn. (this river 'fed' upstream by freshwater springs R. Prior verbatim)**	13	17		

**East New Britain, specimens not 'typical' *pilosellus*.

papuensis at light appear to be consistent for both years. *Haloveloides browni* (Lansbury), in 1990 small numbers were taken at light, very few were taken close inshore. In 1992 no *H. browni* were found at Nagada. There is evidence that *H. browni* is an off-shore species, in West New Britain samples collected by R.N.B. Prior support this possibility.

Despite searches offshore at Nagade Harbour, no specimens were found. *Halovelina anderseni* sp. n. and *H. annemariae* Andersen have a similar pattern of occurrence as *Haloveloides browni*. The 1990 specimens were mostly obtained in light trap samples. This pattern repeated in 1992. The larger than usual numbers of both species in the sample on the 20.v. are difficult to explain, weather conditions were noted as, sea smooth, tide ebbing imperceptibly and no wind, conditions were identical on the 21.v. but the sample was much smaller.

Xenobates solomonensis Lansbury and *X. pilosellus* sp. n. see table 5. *X. pilosellus* was found in larger numbers than *solomonensis* in 1990 whereas in 1992, *pilosellus* was less abundant. The data for both species is ambiguous, being found in almost every sample although *pilosellus* was more commonly found at light than *solomonensis*. Data from New Britain tends to support the hypothesis that *Xenobates* is an inshore genus, often being found where saline and freshwater mingle.

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